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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.
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EXAMINER	
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ART UNIT	**PAPER NUMBER**
1762	17

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Please find below and/or attached an Office communication concerning this application or proceeding.

Commissioner of Patents and Trademarks

Office Action Summary	Application No. 09/121,528	Applicant(s) DERDERIAN, GARO J.	
	Examiner Timothy H. Meeks	Art Unit 1762	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136 (a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).

Status

1)☒ Responsive to communication(s) filed on *17 July 2000* .

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-4, 6-10, 12-36, and 46-68* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-4, 6-10, 12-36, and 46-68* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claims _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are objected to by the Examiner.

11)☐ The proposed drawing correction filed on _____ is: a)☐ approved b)☐ disapproved.

12)☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. § 119

13)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d).

a)☐ All b)☐ Some * c)☐ None of the CERTIFIED copies of the priority documents have been:

1.☐ received.

2.☐ received in Application No. (Series Code / Serial Number) _____ .

3.☐ received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

14)☐ Acknowledgement is made of a claim for domestic priority under 35 U.S.C. & 119(e).

Attachment(s)

15) ☐ Notice of References Cited (PTO-892)
16) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
17) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____ .
18) ☐ Interview Summary (PTO-413) Paper No(s). _____ .
19) ☐ Notice of Informal Patent Application (PTO-152)
20) ☐ Other:

DETAILED ACTION

Response to Amendment and Application Status

The amendment filed on 17 July 2000 in response to the Office Action mailed on 28 April 2000 has been fully considered.

No amendments were made in the paper filed 17 July 2000. Claims 1-4, 6-10, 12-36, and 46-68 remain pending.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claims 56-68 are rejected under 35 U.S.C. 103(a) as being unpatentable over Baum et al. (5,783,716).

Baum et al. disclose a process for depositing platinum films comprising providing a precursor such as methylcyclopentadienyl trimethylplatinum to a chamber containing a substrate, along with an oxidizing gas, such as oxygen and nitrous oxide mixtures, and depositing the platinum film on a substrate at 200-300 C, said platinum film being useful for an electrode for DRAM (Example 6). The claimed substrates are disclosed at col. 7, lines 52-63.

Baum et al. are silent as to the flow rate at which the oxygen/nitrous oxide gas is delivered to the chamber. However, because this flow rate affects the amount of

oxidizing gas mixture provided to the chamber for removal of carbon impurities and would also depend on the amount and type of platinum precursor delivered, deposition rate, etc. which factors determine how much carbon is present, the total flow rate of oxidizing gases to the chamber is a result effective parameter and it would have been a matter of routine experimentation to determine appropriate amounts (flow rates) of the oxidizing gases to provide to optimize removal of carbon from the film.

With respect to claims 61-68, Baum et al. disclose that higher precursor delivery rates are achieved when delivering the precursor by direct liquid injection rather than by using conventional bubbler systems which involve delivering the precursor by bubbling a non-reactive gas therethrough. However, because Baum et al. disclose at col. 1, lines 40-68 that conventional bubbler systems provide sufficient precursor delivery rates unless it is desired to form larger area platinum films with continuous coverage of surfaces of various geometries, it would have been obvious to have used conventional bubblers for delivery of the precursors for applications other than that listed by Baum et al. as being inadequate given the expectation of such delivery system being adequate for these applications.

Baum et al. are silent as to the deposition times and Pt film thicknesses. However, these parameters are clearly directly related and the thickness is a function of the intended purpose. Therefore, adjustment of these result effective parameters through routine experimentation for optimization would have been obvious, absent evidence showing the criticality of using the claimed values.

With respect to claims requiring certain ratios of oxygen to nitrous oxide, Baum et al. disclose that the purpose of the oxidizing gas is to remove carbon facilitate DRAM production (col. 5, lines 27-47) and the relative amounts of the oxidizing gases in the process would affect this result. As such variation of this result effective parameter through routine experimentation, including to values in the claimed range, for optimization would have been obvious absent evidence showing the criticality of using the claimed values.

Please note that Baum et al. explicitly disclose at col. 7, lines 40-45 that that suitable "chemical vapor deposition conditions" for the platinum deposition "may readily be determined without undue experimentation by those of ordinary skill in the art". These "chemical vapor deposition conditions" would clearly include the reaction pressure, flow rates of reactants and carrier gases, deposition times, ratios of reactants to each other and to carrier gases, etc. The examiner maintains, as set forth above, and as explicitly stated by Baum et al. that these conditions are readily determined through routine experimentation for optimization. Therefore, using values within the claimed ranges for these conditions would have been prima facie obvious in the absence of evidence which shows a criticality for using the claimed values.

Claims 61-68 are rejected under 35 U.S.C. 103(a) as being unpatentable over Baum et al. (5,783,716) in view of Kwon et al.

Baum et al. disclose a process for depositing platinum films comprising providing a precursor such as methylcyclopentadienyl trimethylplatinum to a chamber containing

a substrate, along with an oxidizing gas, such as oxygen and nitrous oxide mixtures, and depositing the platinum film on a substrate at 200-300 C, said platinum film being useful for an electrode for DRAM (Example 6). The claimed substrates are disclosed at col. 7, lines 52-63.

Baum et al. are silent as to the flow rate at which the oxygen/nitrous oxide gas is delivered to the chamber. However, because this flow rate affects the amount of oxidizing gas mixture provided to the chamber for removal of carbon impurities and would also depend on the amount and type of platinum precursor delivered, deposition rate, etc. which factors determine how much carbon is present, the total flow rate of oxidizing gases to the chamber is a result effective parameter and it would have been a matter of routine experimentation to determine appropriate amounts (flow rates) of the oxidizing gases to provide to optimize removal of carbon from the film.

Baum et al. disclose that higher precursor delivery rates are achieved when delivering the precursor by direct liquid injection rather than by using conventional bubbler systems which involve delivering the precursor by bubbling a non-reactive gas therethrough. However, because Baum et al. disclose at col. 1, lines 40-68 that conventional bubbler systems provide sufficient precursor delivery rates unless it is desired to form larger area platinum films with continuous coverage of surfaces of various geometries, and because Kwon et al. disclose that using a bubbler with argon inert carrier gas to deliver the same platinum precursor as that used by Baum et al. is effective for depositing a platinum film for an electrode of a memory cell (abstract; experimental), it would have been obvious to use a bubbler to deliver the precursor of

Example 6 of Baum et al. for forming an electrode for a memory cell because doing so would have been expected to be effective.

The other differences with respect to result effective parameters are obvious for the reasons set forth above.

Claims 1-4, 6-10, 12-36, and 46-55 are rejected under 35 U.S.C. 103(a) as being unpatentable over Baum et al. (5,783,716) in view of Kwon et al. and Chen et al. (Applied Physics Letters).

Baum et al. disclose a process for depositing platinum films comprising providing a precursor such as methylcyclopentadienyl trimethylplatinum to a chamber containing a substrate, along with an oxidizing gas, such as oxygen and nitrous oxide mixtures, and depositing the platinum film on a substrate at 200-300 C, said platinum film being useful for an electrode for DRAM (Example 6). The claimed substrates are disclosed at col. 7, lines 52-63.

Baum et al. are silent as to the pressure in the deposition chamber during deposition. However, because Baum et al. do not limit the deposition pressure and because Kwon et al. and Chen et al. disclose that deposition pressures of 2 Torr and atmospheric, respectively, are effective deposition pressures for depositing Pt films by CVD using the precursors disclosed by Baum et al. (see Kwon at page 2849 and Chen at page 1591), it would have been obvious to have used deposition pressures in this range (2 Torr to atmospheric (760 Torr)) which overlaps with the claimed ranges because these deposition pressures would have been expected to be effective for

depositing the platinum films by CVD with these precursors, especially in the absence of objective evidence which shows an unexpected result derived from using pressures in the claimed ranges.

Baum et al. are silent as to the flow rate at which the oxygen/nitrous oxide gas is delivered to the chamber. However, because this flow rate affects the amount of oxidizing gas mixture provided to the chamber for removal of carbon impurities and would also depend on the amount and type of platinum precursor delivered, deposition rate, etc. which factors determine how much carbon is present, the total flow rate of oxidizing gases to the chamber is a result effective parameter and it would have been a matter of routine experimentation to determine appropriate amounts (flow rates) of the oxidizing gases to provide to optimize removal of carbon from the film.

With respect to claims 6-36, Baum et al. disclose that higher precursor delivery rates are achieved when delivering the precursor by direct liquid injection rather than by using conventional bubbler systems which involve delivering the precursor by bubbling a non-reactive gas therethrough. However, because Baum et al. disclose at col. 1, lines 40-68 that conventional bubbler systems provide sufficient precursor delivery rates unless it is desired to form larger area platinum films with continuous coverage of surfaces of various geometries, it would have been obvious to have used conventional bubblers for delivery of the precursors for applications other than that listed by Baum et al. as being inadequate given the expectation of such delivery system being adequate for these applications. Alternatively, because Kwon et al. disclose that using a bubbler with argon inert carrier gas to deliver the same platinum precursor as that used by

Baum et al. is effective for depositing a platinum film for an electrode of a memory cell (abstract; experimental), it would have been obvious to use a bubbler to deliver the precursor of Example 6 of Baum et al. for forming an electrode for a memory cell because doing so would have been expected to be effective.

With respect to the claims requiring specified flow rates of inert gases for delivering the precursor, this clearly affects the amount of precursor delivered to the process which affects the deposition rate, etc. Therefore, this is a result effective parameter and adjustment of this result effective parameter through routine experimentation for optimization would have been obvious absent evidence showing the criticality of using the claimed flow rates.

Likewise, Baum et al. are silent as to the deposition times and Pt film thicknesses. However, these parameters are clearly directly related and the thickness is a function of the intended purpose. Therefore, adjustment of these result effective parameters through routine experimentation for optimization would have been obvious, absent evidence showing the criticality of using the claimed values.

With respect to claims requiring certain ratios of oxygen to nitrous oxide, Baum et al. disclose that the purpose of the oxidizing gas is to remove carbon facilitate DRAM production (col. 5, lines 27-47) and the relative amounts of the oxidizing gases in the process would affect this result. As such variation of this result effective parameter through routine experimentation, including to values in the claimed range, for optimization would have been obvious absent evidence showing the criticality of using the claimed values.

Please note that Baum et al. explicitly disclose at col. 7, lines 40-45 that that suitable "chemical vapor deposition conditions" for the platinum deposition "may readily be determined without undue experimentation by those of ordinary skill in the art". These "chemical vapor deposition conditions" would clearly include the reaction pressure, flow rates of reactants and carrier gases, deposition time, ratios of reactants to each other and to carrier gases, etc. The examiner maintains, as set forth above, and as explicitly stated by Baum et al. that these conditions are readily determined through routine experimentation for optimization. Therefore, using values within the claimed ranges for these conditions would have been prima facie obvious in the absence of evidence which shows a criticality for using the claimed values.

Claims 1-4, 6-10, 12-36, and 46-68 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kwon et al. in view of Baum et al and Chen et al.

Kwon et al. disclose deposition of a platinum film as a bottom electrode of a memory cell comprising bubbling argon over methylcyclopentadienyl trimethylplatinum precursor to deliver it to a chamber having a substrate of silica/Si at 300-400C, providing oxygen into the chamber to remove carbon contamination, providing a chamber pressure of 2 Torr, and depositing the platinum film (abstract; Experimental).

Kwon et al. do not disclose including nitrous oxide with the oxygen. However, because Baum et al. disclose that including nitrous oxide/oxygen mixture with methylcyclopentadienyl trimethylplatinum is effective for providing a DRAM electrode and reduces carbon incorporation (col. 5, lines 28-48 and example 6), it would have

been obvious to have included nitrous oxide in the oxygen gas of Kwon et al. with the expectation of achieving the results discussed by Baum et al.

Kwon et al. exemplify a deposition pressure of 2 Torr but do not limit the pressure thereto. Because Kwon et al. do not limit the pressure to that exemplified and because Chen et al. disclose that an atmospheric deposition pressure is effective for deposition of Pt films by CVD using analogous precursors, it is suggested that pressures from 2 Torr to atmospheric would be effective for said deposition. This range overlaps with the claimed pressure ranges and therefore using pressures in the claimed ranges would have been obvious absent evidence showing an unexpected result derived from using the claimed pressures.

Baum et al. are silent as to the flow rate at which the oxygen/nitrous oxide gas is delivered to the chamber. However, because this flow rate affects the amount of oxidizing gas mixture provided to the chamber for removal of carbon impurities and would also depend on the amount and type of platinum precursor delivered, deposition rate, etc. which factors determine how much carbon is present, the total flow rate of oxidizing gases to the chamber is a result effective parameter and it would have been a matter of routine experimentation to determine appropriate amounts (flow rates) of the oxidizing gases to provide to optimize removal of carbon from the film.

The other differences with respect to result effective parameters are obvious for the reasons set forth above.

Response to Arguments

Applicant's arguments filed on 17 July 2000 have been fully considered but they are not persuasive.

Applicants argue that the total flow rate is not a result effective parameter. The examiner maintains that it is for the reasons clearly set forth in the last office action. Applicants then appear to argue that there is a criticality for using the claimed flow rates in that their Examples 1-4 in the specification show that using the claimed flow rates results in coverage over 60% which is a marked improvement over the prior art. This data, however, falls far short from conclusively showing a criticality for using the claimed flow rate of oxidizing gas. For one thing, the data is not commensurate in scope with the claims. The data only show results for using 1800 sccm which cannot be said to represent the scope of the claimed range. Furthermore, any result obtained by varying one reactant (i.e., oxidizing gas flow) will depend on the amount of the other reactant supplied. It is not clear that the same results would be obtained over the range of any amount of the platinum precursor flow of which the claims are inclusive. For these reasons, the evidence provided is not sufficient to show a criticality for using the claimed range of flow rates.

Applicants argue that there is nothing to indicate that the pressures of the Kwon and Chen references would be appropriate for the Baum deposition chemistry and that the references are not combinable because of the diverse chemistries involved. The deposition chemistry between Kwon, Chen, and Baum is not as diverse as applicants appear to argue. In all three processes, there is decomposition of the same precursor to deposit a platinum film. The Baum reference teaches the same precursors and

oxidizing gas as claimed but does not explicitly disclose which pressures are operable but does state that "the platinum is deposited from the platinum source reagent vapor on the substrate, under **suitable chemical vapor deposition conditions such as may readily be determined without undue experimentation by those of ordinary skill in the art**" (Baum at col. 7, lines 33-45, emphasis added). Such "suitable chemical vapor deposition conditions" would clearly include a deposition pressure. As Baum does not provide a pressure, one would be left to review references to find appropriate pressures to use. Such review would clearly yield the secondary references which show deposition of platinum using the same platinum precursor and that such depositions can be performed at a pressure of 2 Torr and a pressure of atmospheric. Given these teachings, one of ordinary skill in the art would reasonably expect that the platinum deposition with this precursor would be operable over such a range. In the absence of secondary evidence showing a criticality of the claimed pressures, it remains obvious to use the claimed pressures for the reasons set forth above.

Conclusion

THIS ACTION IS MADE FINAL. Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any

extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Timothy H. Meeks whose telephone number is (703) 308-3816. The examiner can normally be reached on 8:00-5:30.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Shrive P. Beck can be reached on (703) 308-2333. The fax phone numbers for the organization where this application or proceeding is assigned are (703) 305-5408 for regular communications and (703) 305-3599 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0661.

Timothy H. Meeks
Primary Examiner
Art Unit 1762

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August 17, 2000